

Magnetically Modified Asymmetric Supercapacitors, Phase I

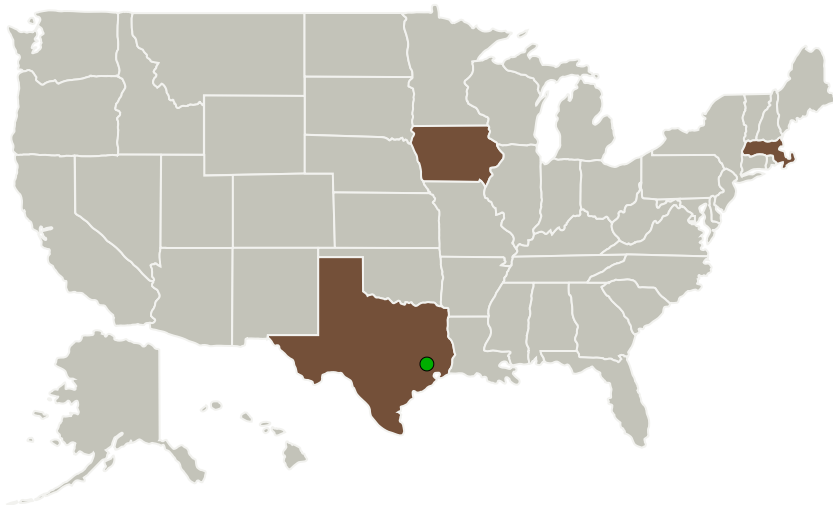
Completed Technology Project (2010 - 2011)



Project Introduction

This Small Business Innovation Research Phase I project is for the development of an asymmetric supercapacitor that will have improved energy density and cycle life. Supercapacitors that utilize an aqueous electrolyte are limited to a maximum voltage of 1 volt due to the decomposition of water. Methods used to increase voltage include use of an organic electrolyte, which introduces additional complexity, cost and undesirable environmental concerns, or to use an asymmetric or hybrid configuration, with two different electrode materials. Supercapacitors that utilize MnO₂ and carbon as the electrodes have been developed. However, due to changes in the MnO₂ while cycling the capacitor to 2 volts, the MnO₂ will change over time and lose its ability to cycle. One method around this problem, reported in the literature, is to charge the capacitor to 1.5 volts, resulting in reduced power and energy storage. In this Phase I program Giner, Inc. will demonstrate a novel solution to this problem by modifying the MnO₂ positive electrode through the use of magnetic microparticles dispersed throughout the electrode structure. Using a Giner, Inc. novel high-energy density carbon as the negative electrode, complete, button-cell capacitors will be assembled and tested.

Primary U.S. Work Locations and Key Partners



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Organizations Performing Work	Role	Type	Location
Giner, Inc.	Lead Organization	Industry	Newton, Massachusetts
● Johnson Space Center(JSC)	Supporting Organization	NASA Center	Houston, Texas
University of Iowa	Supporting Organization	Academia	Iowa City, Iowa

Primary U.S. Work Locations	
Iowa	Massachusetts
Texas	

Project Transitions

▶ **January 2010:** Project Start

✓ **January 2011:** Closed out

Closeout Documentation:

- Final Summary Chart(<https://techport.nasa.gov/file/139199>)

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

Giner, Inc.

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

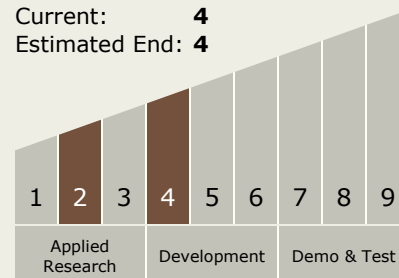
Carlos Torrez

Principal Investigator:

John A Kosek

Technology Maturity (TRL)

Start: 2
Current: 4
Estimated End: 4



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Technology Areas

Primary:

- TX12 Materials, Structures, Mechanical Systems, and Manufacturing
 - └ TX12.1 Materials
 - └ TX12.1.6 Materials for Electrical Power Generation, Energy Storage, Power Distribution and Electrical Machines

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System